# Stem cell-derived extracellular vesicles to reverse radiation-induced brain injury

## Grant Award Details

Stem cell-derived extracellular vesicles to reverse radiation-induced brain injury

**Grant Type:** Quest - Discovery Stage Research Projects

**Grant Number:** DISC2-12400

**Project Objective:** To develop a human neural stem cell-derived exosome therapy for ameliorating brain cancer therapy-induced cognitive impairments and neuroinflammation

**Investigator:**

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| **Name:** | Munjal Acharya |
| **Institution:** | University of California, Irvine |
| **Type:** | PI |

**Disease Focus:** Brain Cancer, Cancer, Neurological Disorders, Solid Tumors

**Human Stem Cell Use:** Embryonic Stem Cell

**Award Value:** $1,064,724

**Status:** Active

## Grant Application Details

**Application Title:** Stem cell-derived extracellular vesicles to reverse radiation-induced brain injury

**Public Abstract:**

**Research Objective**

These preclinical studies will discover the efficacy of stem cell-derived, nanoscale, extracellular vesicles (candidate) to treat adverse effects of cancer therapy on brain function and cognition.

**Impact**

Stem cell-derived extracellular vesicles will address the confounders of stem cells (tumors, immunorejection, immunosuppression) & mitigate debilitating side-effects of cancer therapy on the brain.

**Major Proposed Activities**

- Demonstrate the effectiveness of IV injections of stem cell-derived, nanoscale, extracellular-vesicles (EVs) to improve cognition in the mouse model of radiation- and chemo-therapy for brain cancers.
- Determine the ability of EV treatment to protect against adverse effects of cancer therapy including neuro-inflammation, synaptic and micro-vascular damage in the brain.
- Establish the neurocognitive benefits of injecting stem cell-derived-EV in brain cancer-bearing mice receiving combined radiation- and chemo-therapy (temozolomide, TMZ).
- Elucidate the impact of stem cell-derived-EV injections on neuropathological hallmarks of radiation- and chemo-therapy (TMZ) in the cancer-bearing mice brains.
- Determine the safety and rule out the toxicity of stem cell-derived EV treatment in brain and peripheral organs in the mice receiving radiation- and chemo-therapy (TMZ) for brain cancer.
- Confirm miRNA-124-based mechanism (commonly found within the EV cargo) of stem cell-derived EV-mediated neuroprotection in the mice undergoing radiation- and chemo-therapy for brain cancers.

**Statement of Benefit to California:**

In California, nearly 187,000 patients diagnosed with cancer will be alive in 5 years & more than 1.88 million have a history of cancer. Importantly, adult & childhood cancer survivors suffer from severe & persistent cognitive deficits that adversely affect their quality of life (QOL). A stem cell-based therapeutic could reduce inflammation & restore the cognitive function that may significantly improve patient's QOL, reduce financial hardship on patients, caregivers & the state of California.

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